

METHOD AND APPARATUS FOR MATERIAL PROCESSING

Paul E. Denney et al.

Appl. No.: 10/803,272 Atty Docket: LOMASR.021CP1

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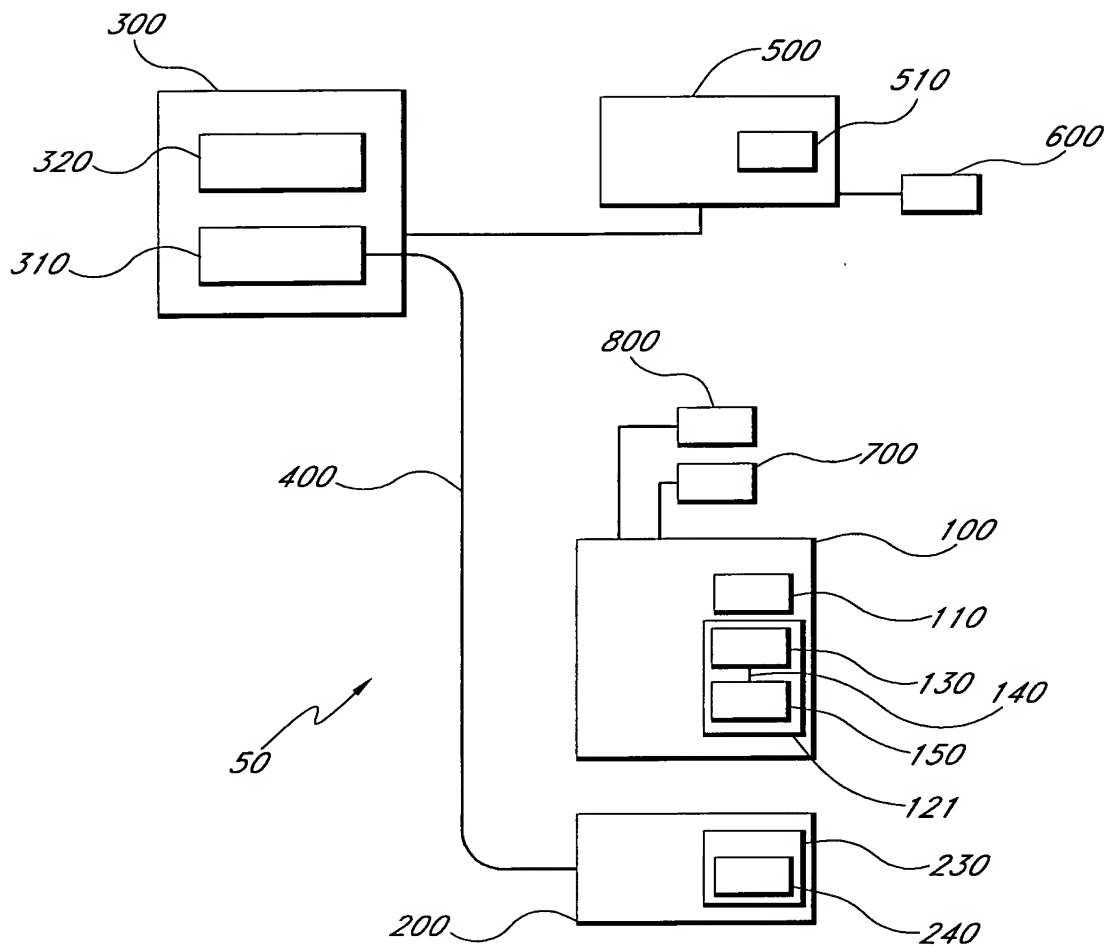
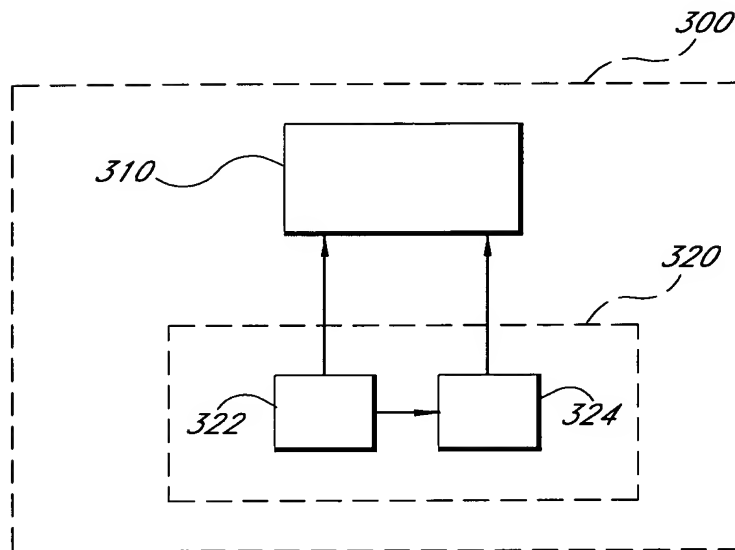
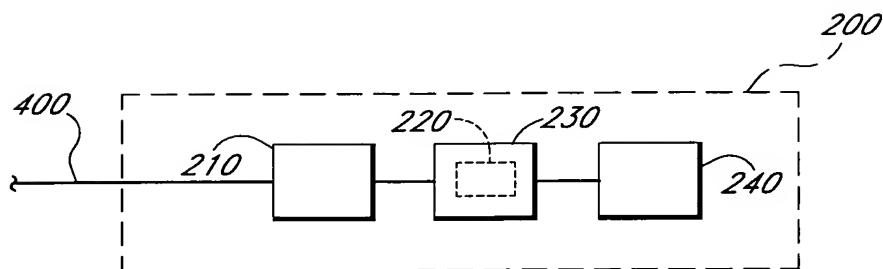


FIG. 1



*FIG. 2*



*FIG. 3A*

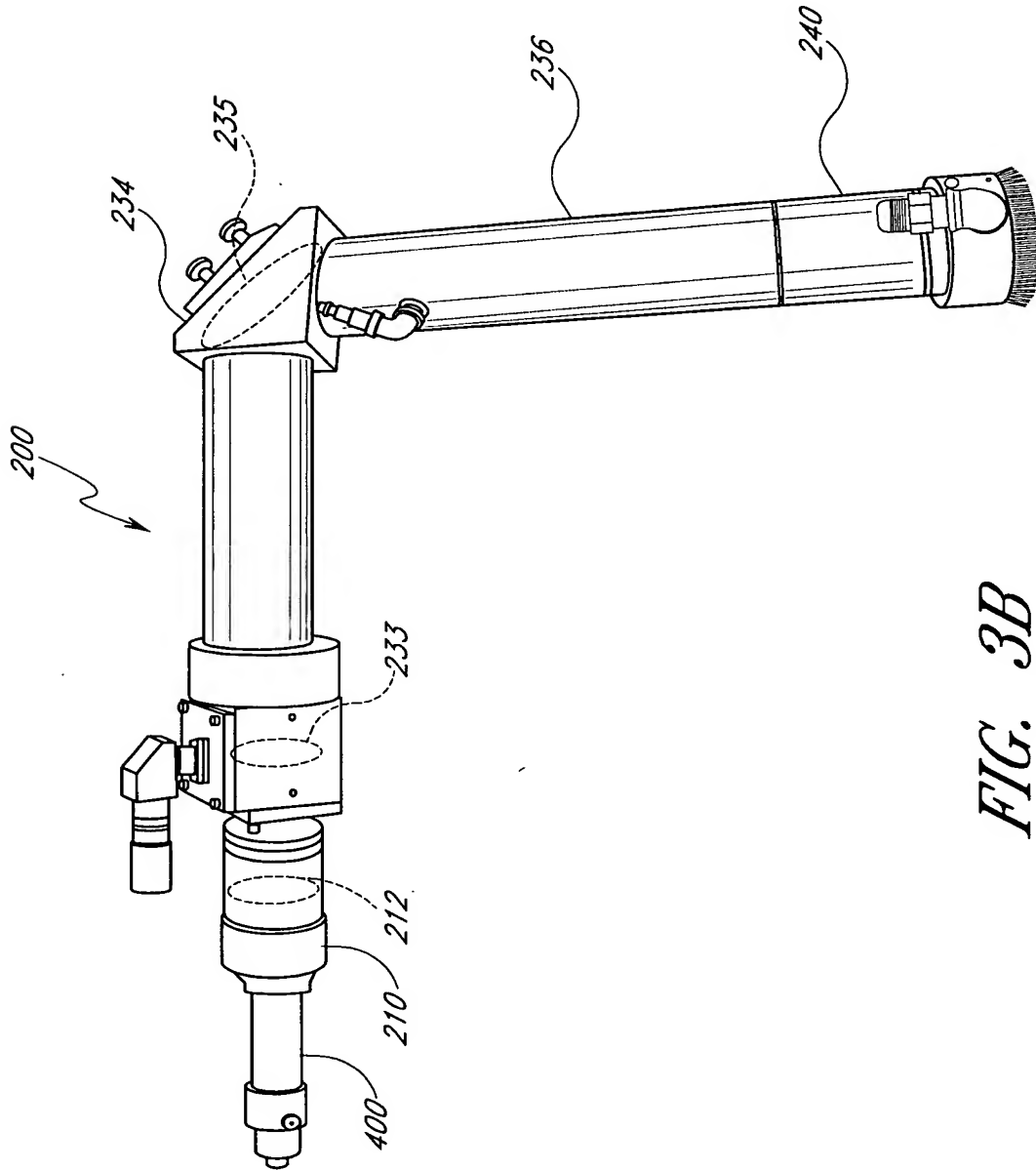
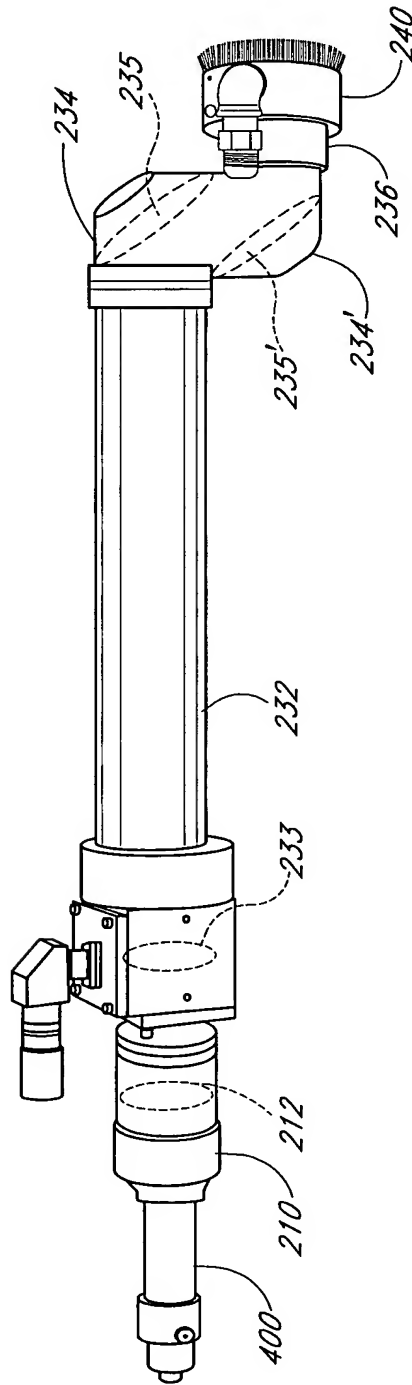
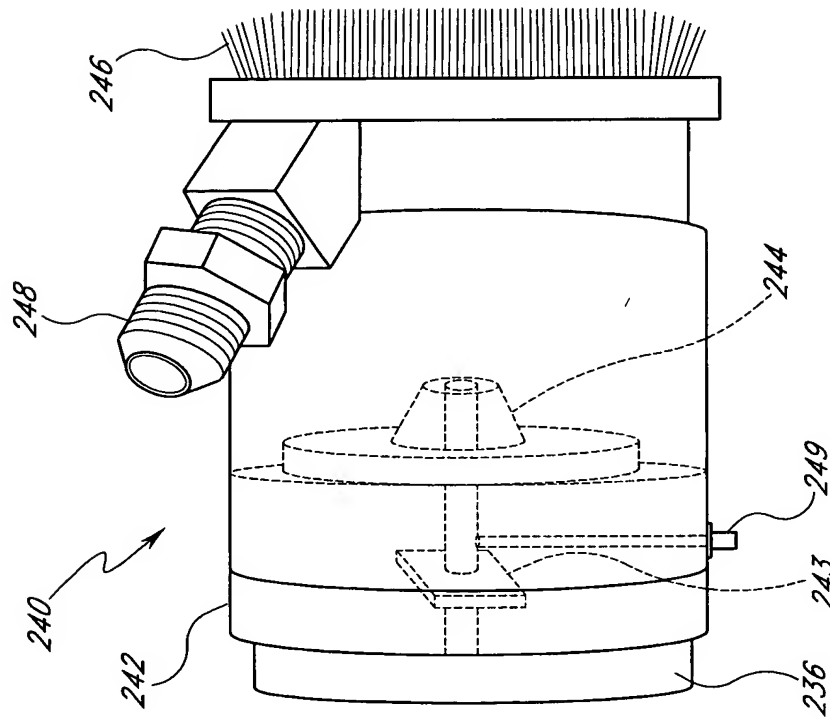


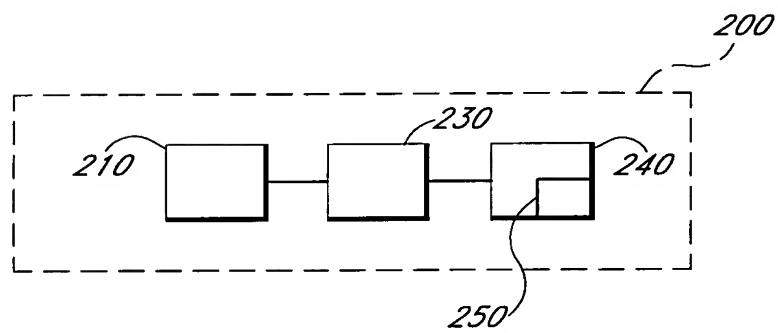
FIG. 3B



*FIG. 3C*



**FIG. 4**



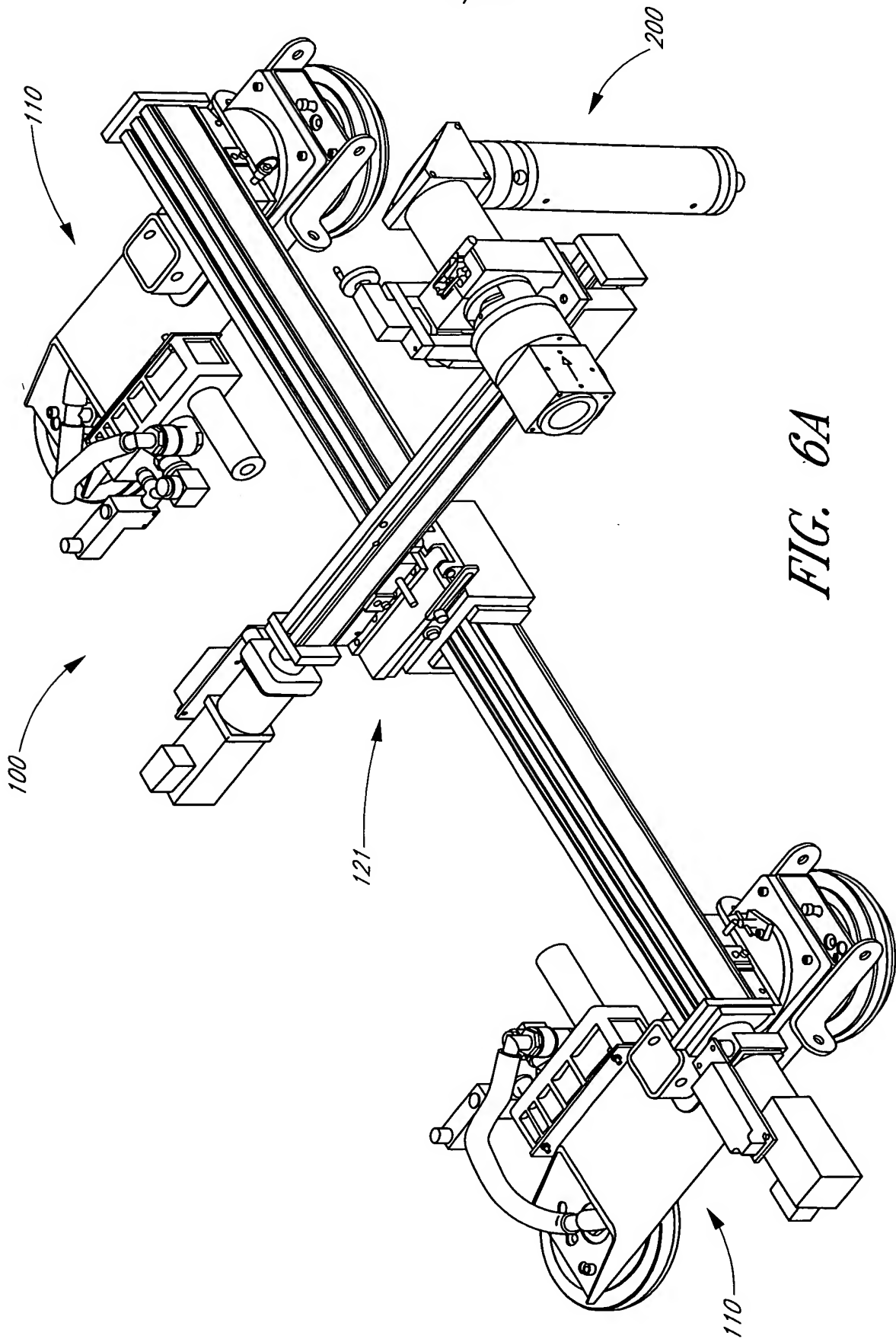
*FIG. 5*

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*FIG. 6A*

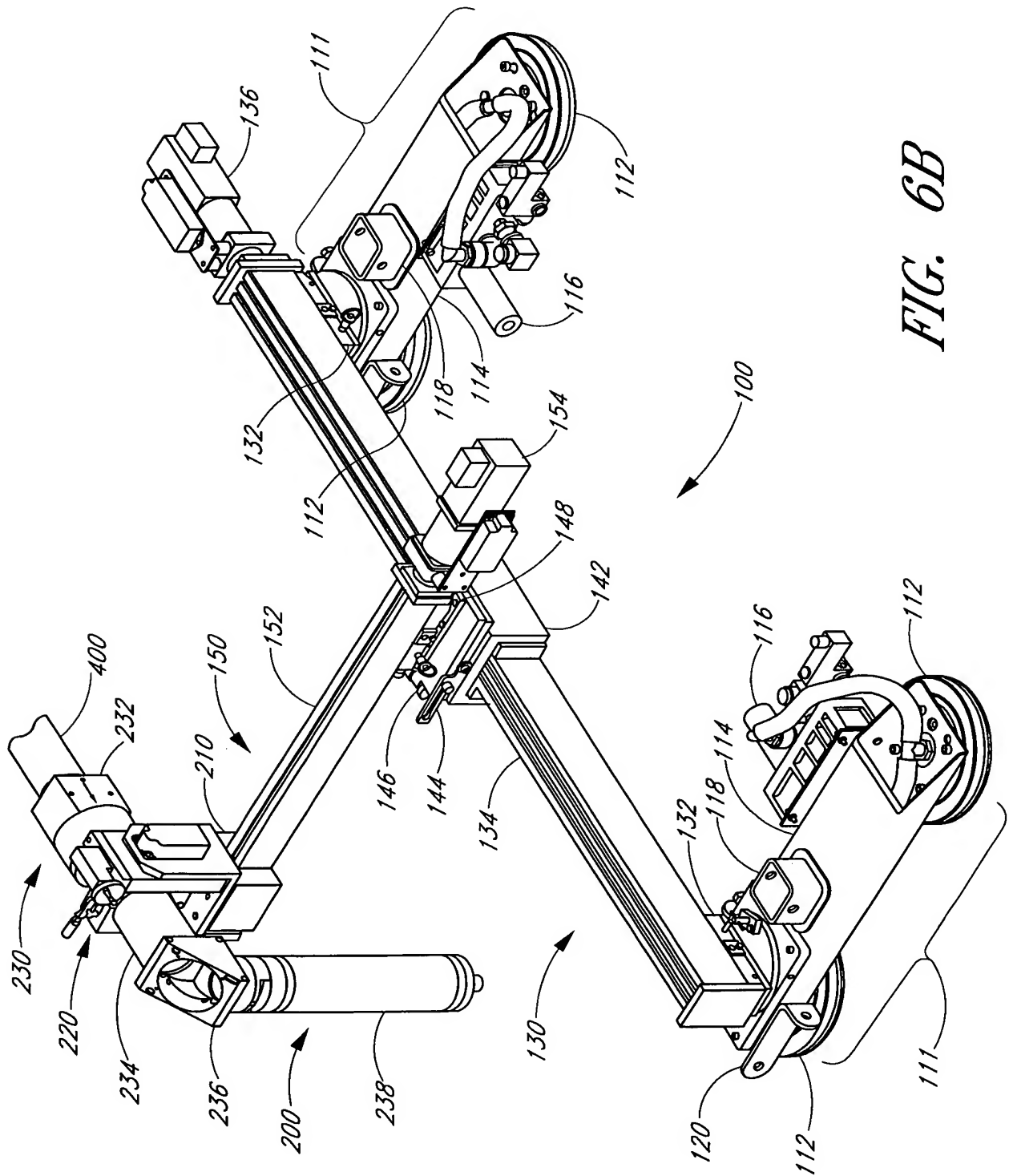


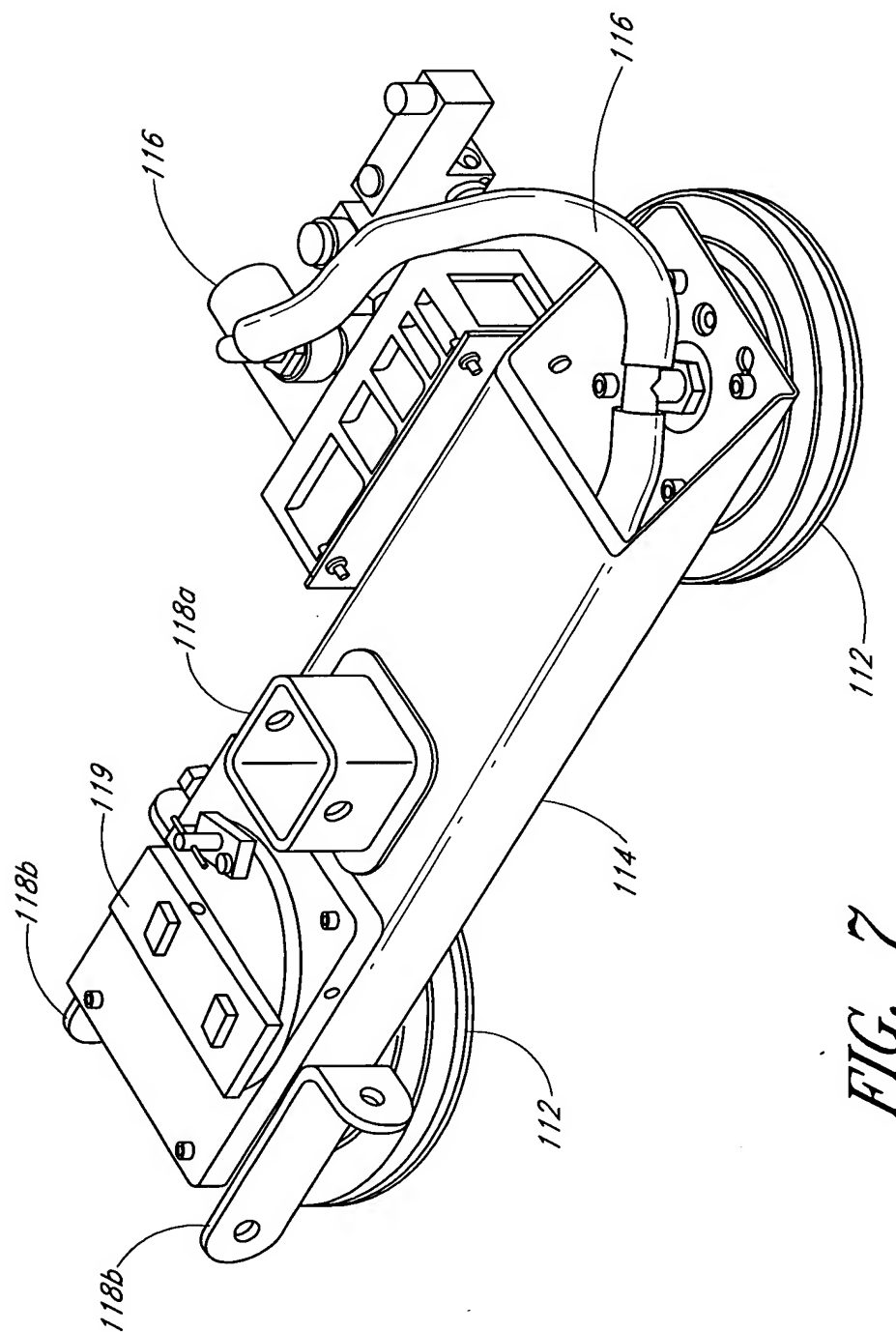
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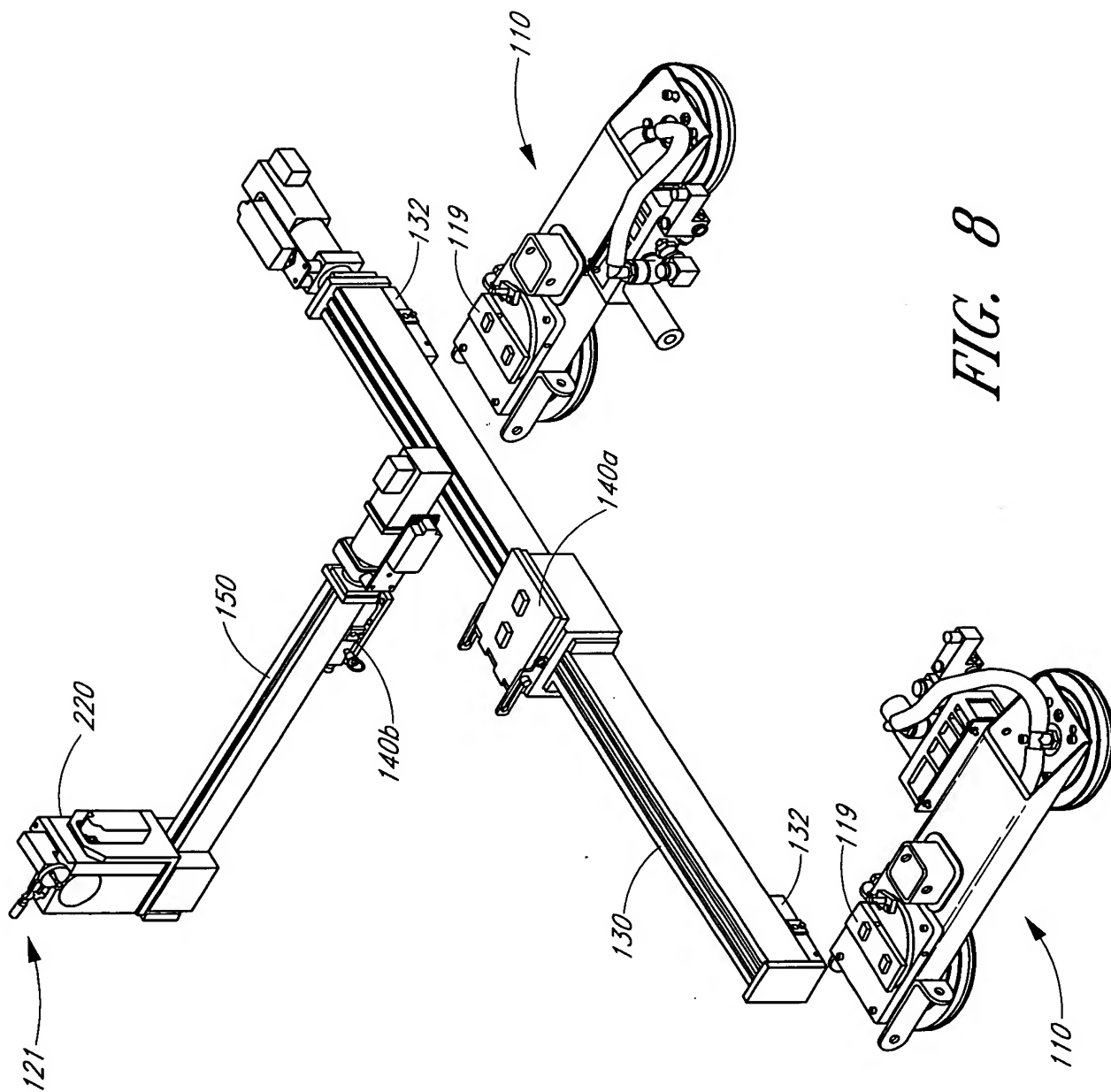
**FIG. 7**

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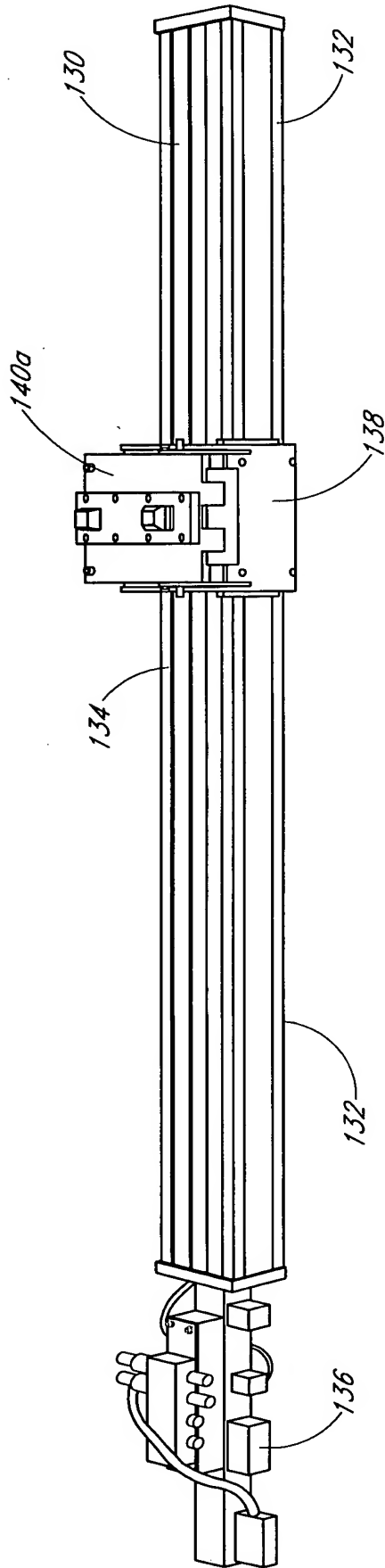
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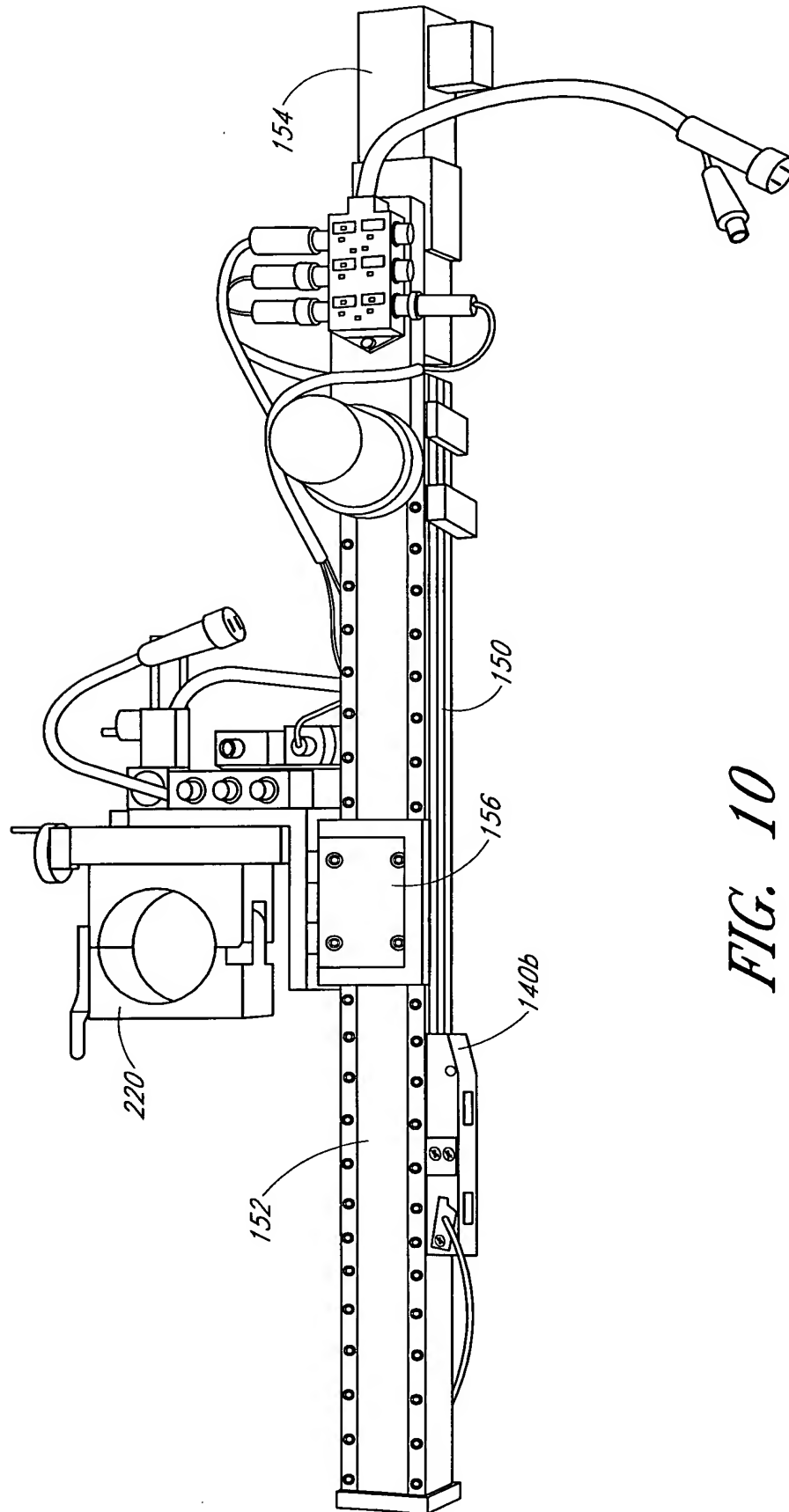


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*FIG. 9*

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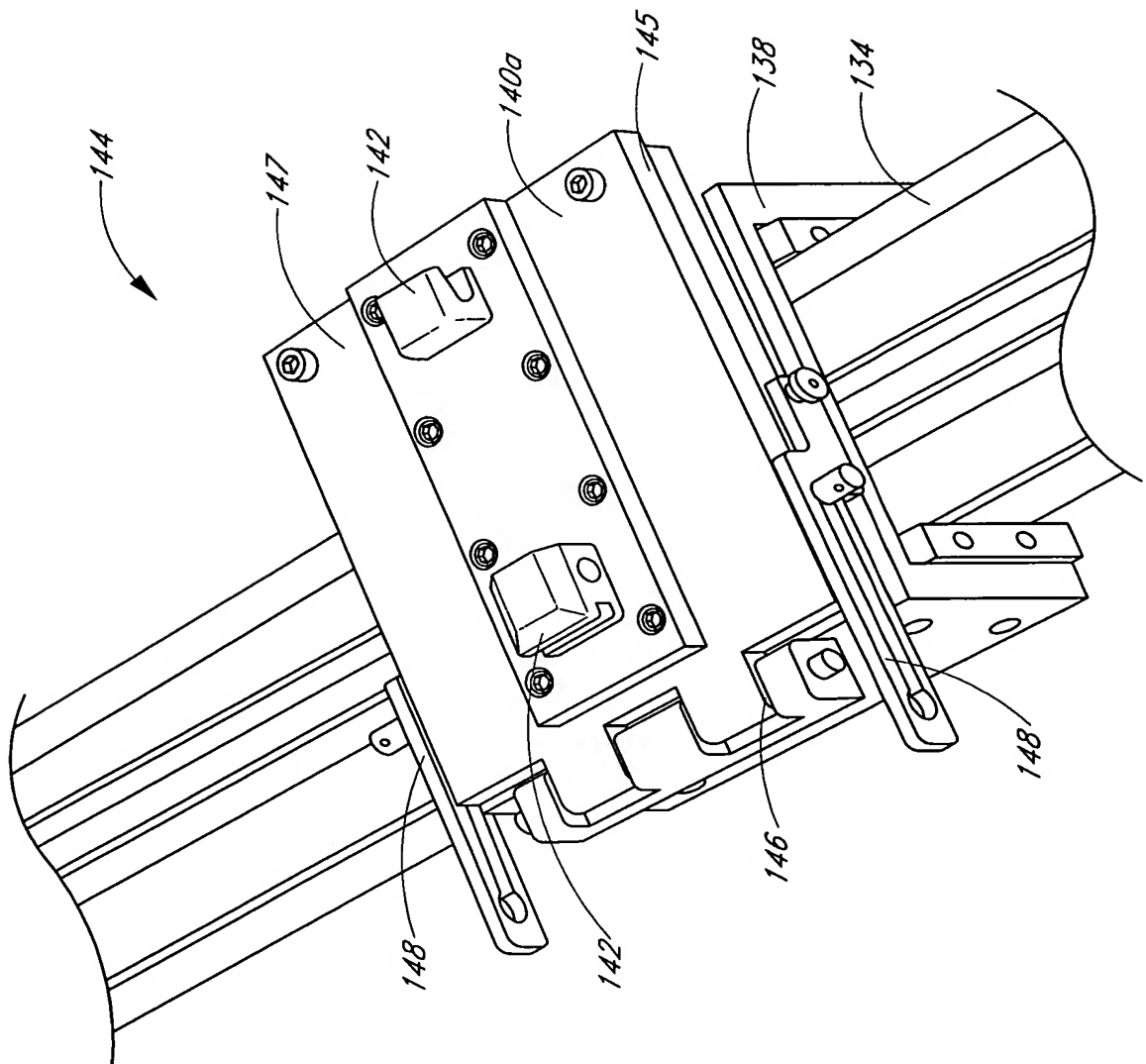


*FIG. 10*

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**FIG. 11A**

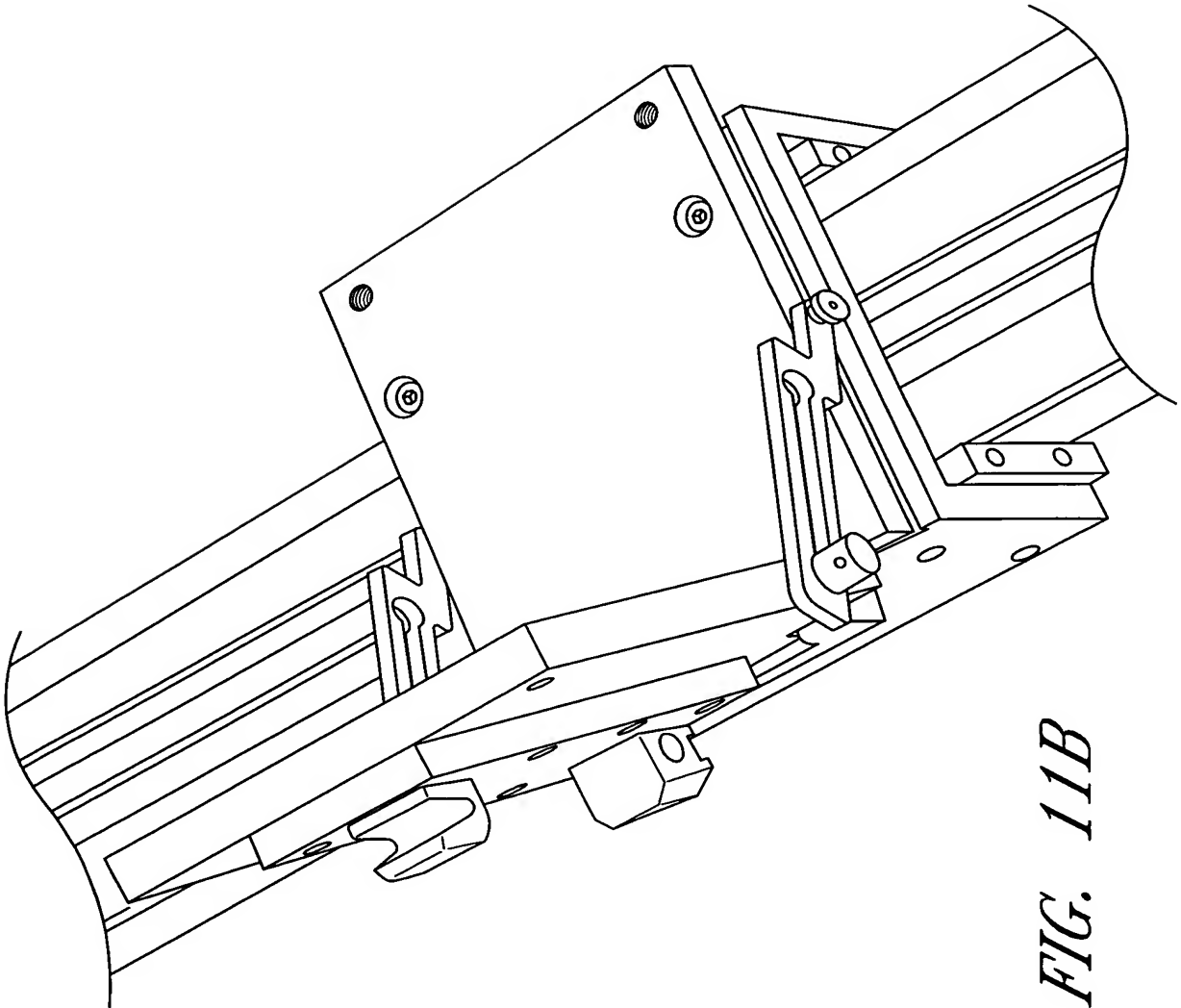


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**FIG. 11B**

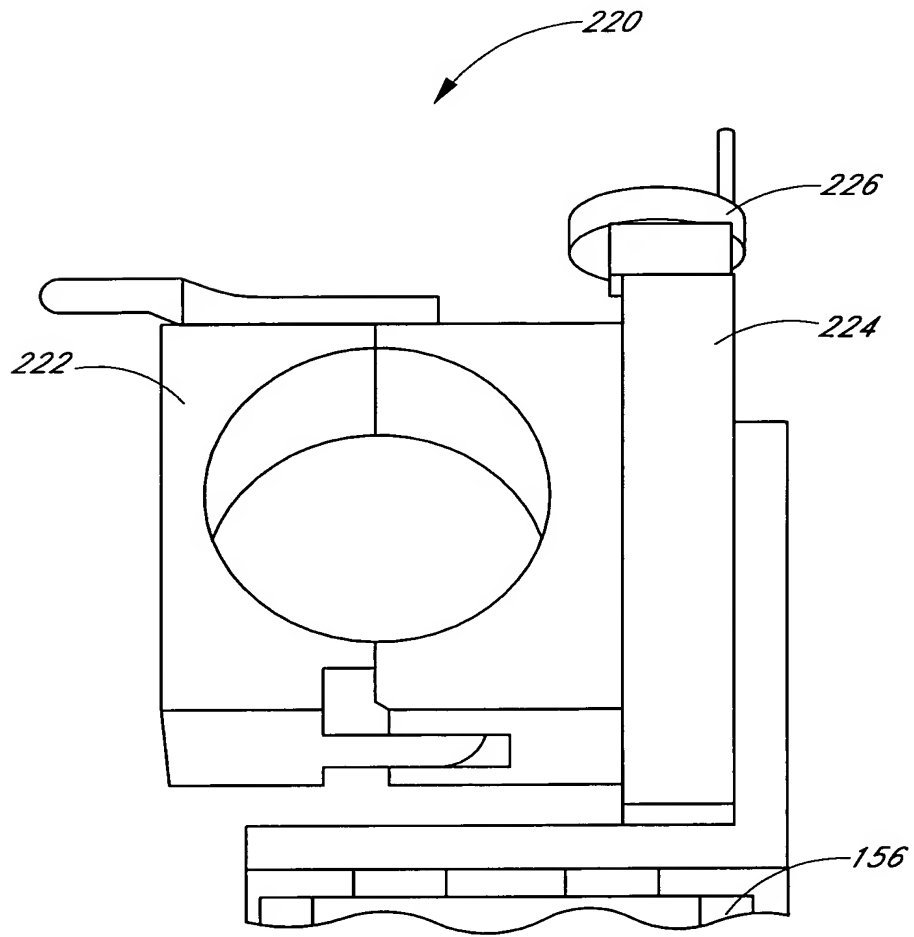


FIG. 12

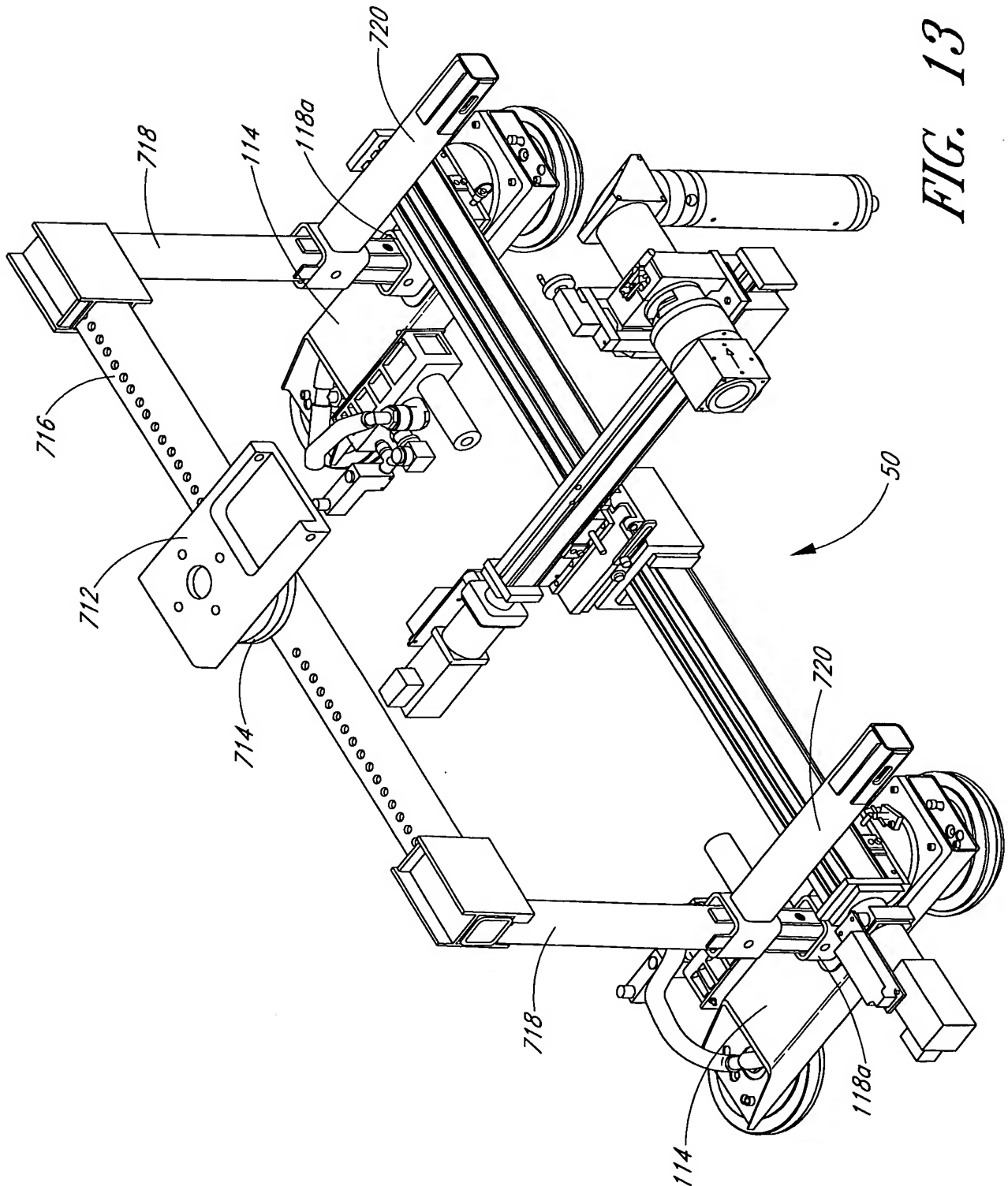


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**FIG. 13**

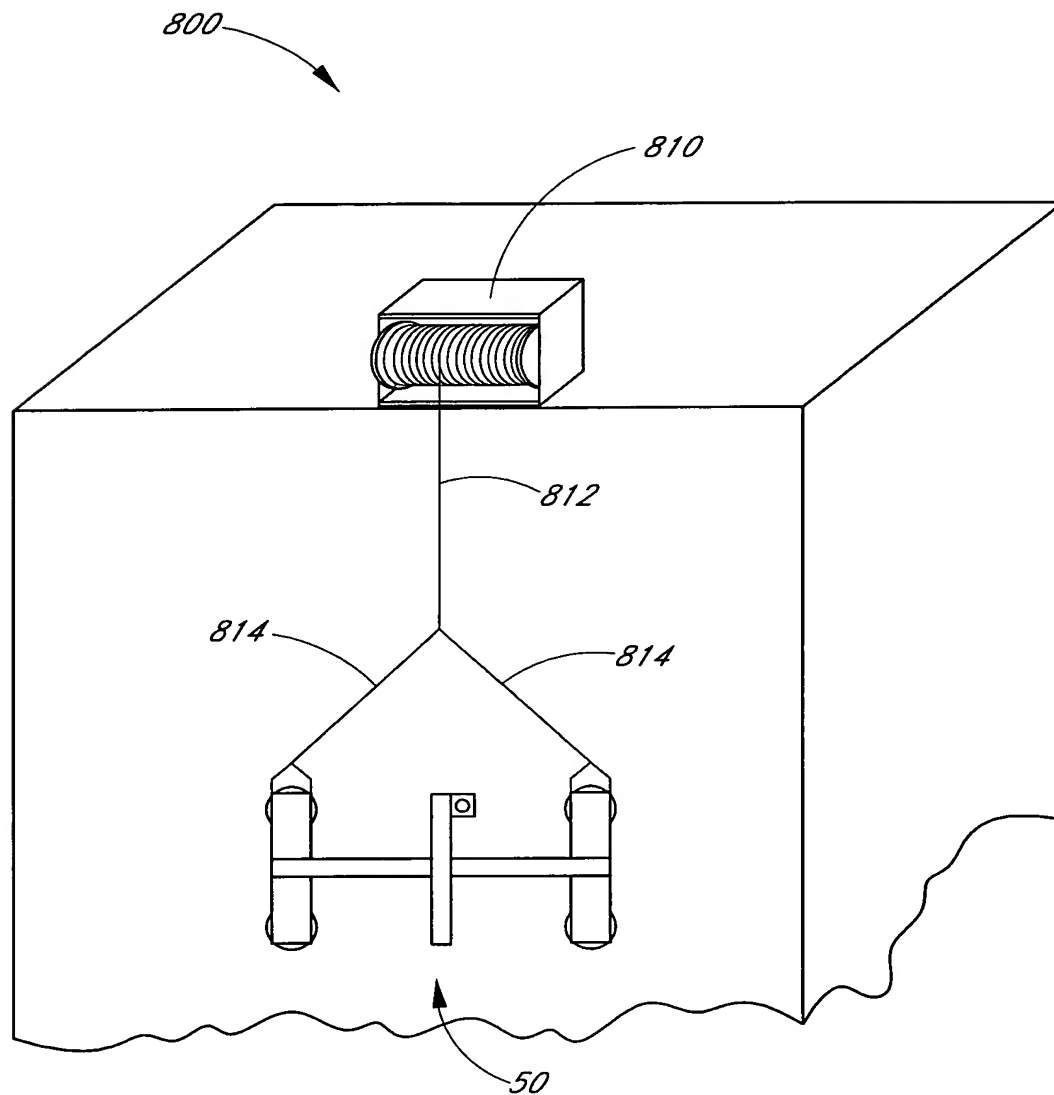


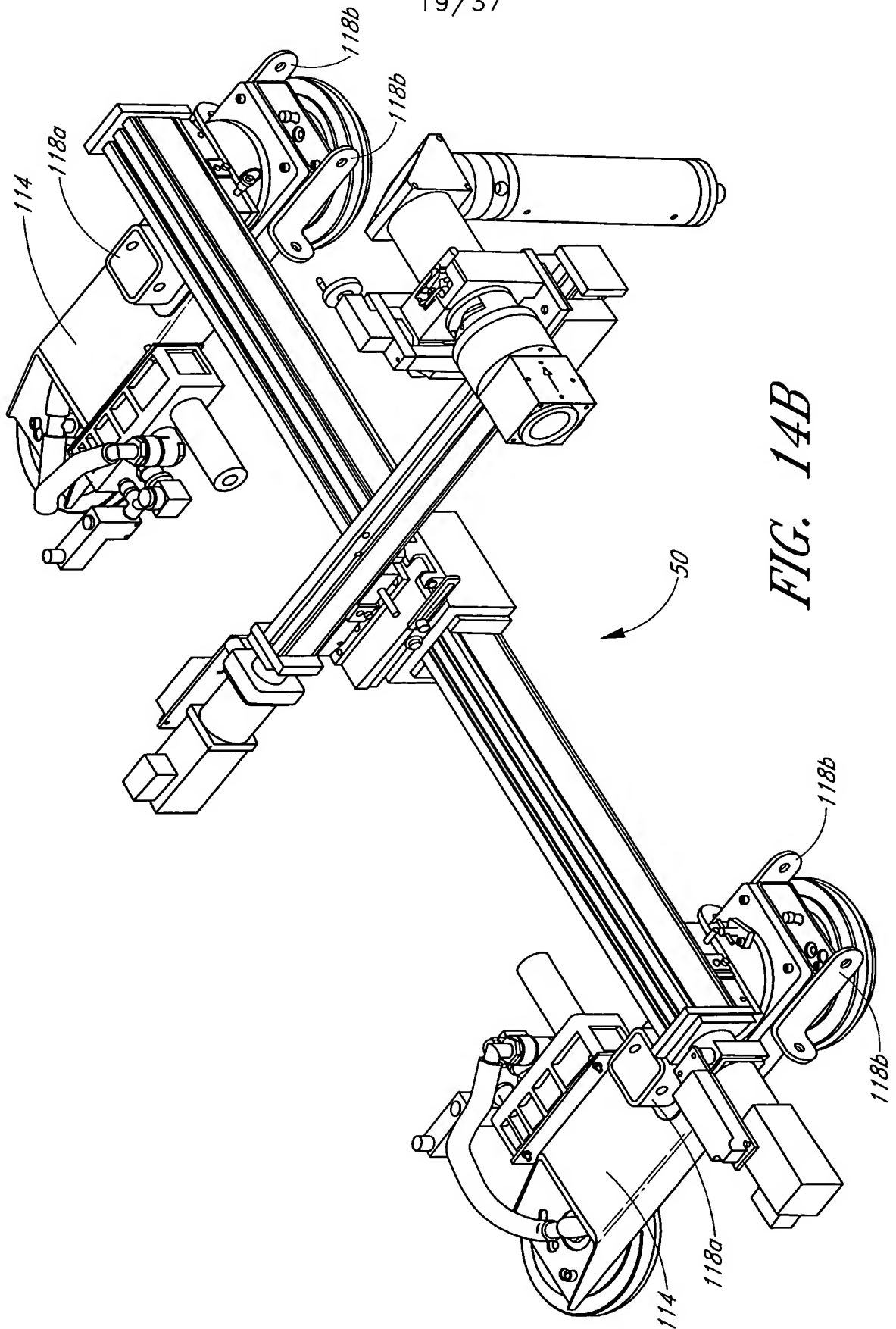
FIG. 14A

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**FIG. 14B**

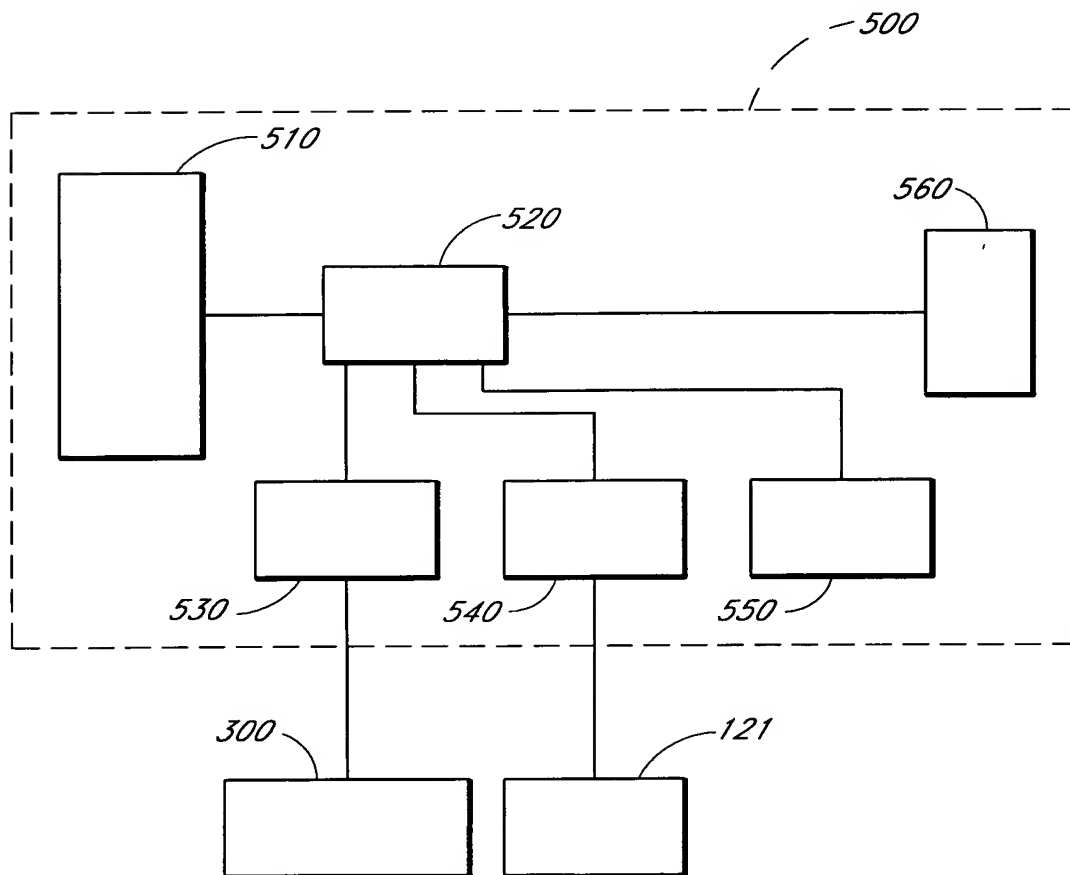


FIG. 15

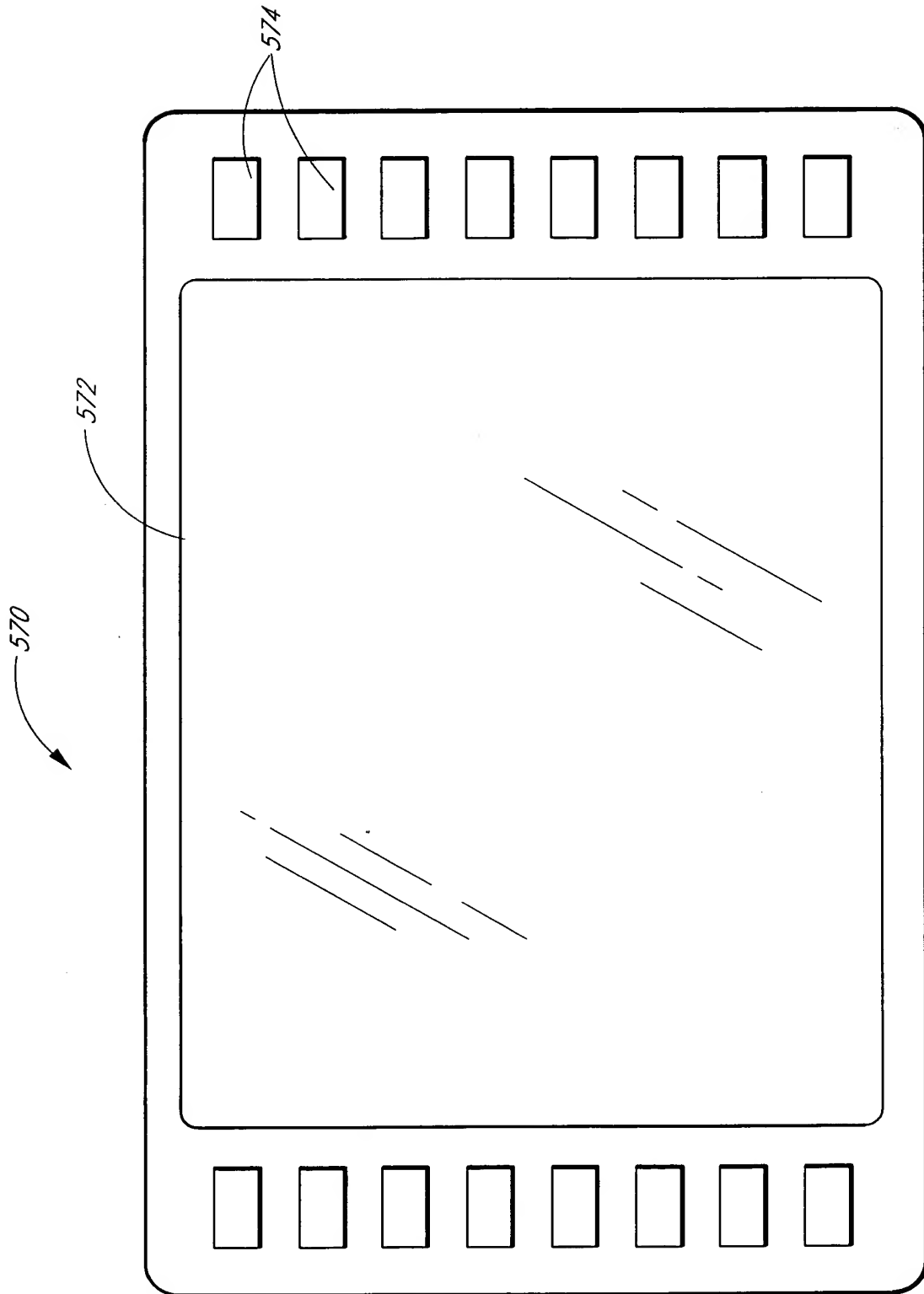


FIG. 16

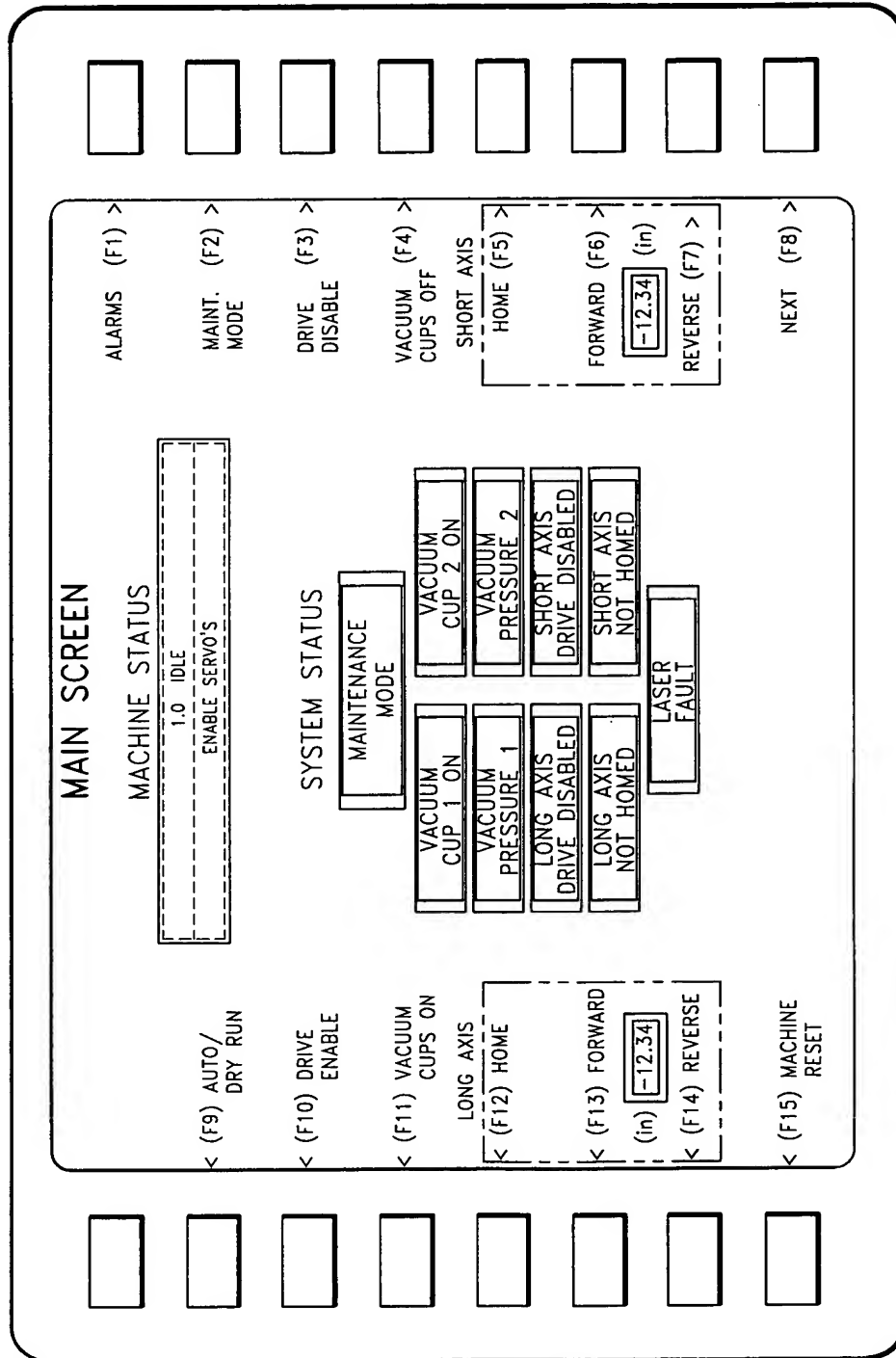


FIG. 17A

SELECT OPERATION SCREEN

MACHINE STATUS

1.0 IDLE

ENABLE SERVO'S

LONG AXIS POSITION

-12.34 (in)

SYSTEM STATUS

MAINTENANCE MODE

CIRCLE IDLE

PIERCE IDLE

STRAIGHT CUT IDLE

SURFACE KEYING IDLE

SHORT AXIS POSITION

-12.34 (in)

< (F9) AUTO/  
DRY RUN

< (F11) CIRCLE

< (F12) PIERCE

< (F13) STRAIGHT CUT

< (F14) SURFACE  
KEYING

< (F15) MACHINE  
RESET

NEXT (F8) >

FIG. 17B

**CIRCLE SETUP/OPERATION SCREEN**

< (F9) AUTO/  
DRY RUN

**MACHINE STATUS**

1.0 IDLE  
ENABLE SERVO'S

**CIRCLE STATUS**

2.0 CIRCLE SEQUENCE IDLE  
PRESS CYCLE START TO BEGIN

< (F11) CYCLE  
START

**SYSTEM STATUS**

MAINTENANCE  
MODE

**CIRCLE PARAMETERS**

LONG AXIS  
POSITION

-12.34 (in)

SHORT AXIS  
POSITION

-12.34 (in)

> (F4) >  
STOP

**PROGRAM NUMBER**

REVOLUTIONS

STATUS 1234  
SET POINT 1234  
COUNT 123

DIAMETER (in)

STATUS -1.234  
SET POINT -1.234

**TIME (sec)**

STATUS 1234  
SET POINT 1234

**SPEED (in/min)**

STATUS -12.34  
SET POINT -12.34

< (F15) MACHINE  
RESET

NEXT (F8) >

FIG. 17C



**PIERCE SETUP/OPERATION SCREEN**

**MACHINE STATUS**

1.0 IDLE  
ENABLE SERVO'S

**PIERCE STATUS**

3.0 PIERCE SEQUENCE IDLE  
PRESS CYCLE START TO BEGIN

**SYSTEM STATUS**

MAINTENANCE  
MODE

**PIERCE PARAMETERS**

LONG AXIS POSITION

-12.34 (in)

SHORT AXIS POSITION

-12.34 (in)

TIME (sec)

STATUS 1234  
SET POINT 1234

LBU PROGRAM NUMBER

STATUS 12  
SET POINT 12

< (F9) AUTO/  
DRY RUN

< (F11) CYCLE  
START

< (F15) MACHINE  
RESET

CYCLE (F4) >  
STOP

NEXT (F8) >

FIG. 17D

**CUT SETUP/OPERATION SCREEN**

**MACHINE STATUS**

1.0 IDLE  
ENABLE SERVO'S

**CUT STATUS**

4.0 CUT SEQUENCE IDLE  
PRESS CYCLE START TO BEGIN

**SYSTEM STATUS**

MAINTENANCE  
MODE

< (F9) AUTO/  
DRY RUN

< (F11) CYCLE  
START

< (F13) LONG  
AXIS

< (F14) SHORT  
AXIS

< (F15) MACHINE  
RESET

LONG AXIS  
POSITION  

-12.34 (in)

SHORT AXIS  
POSITION  

-12.34 (in)

**CUT PARAMETERS**

SPEED (in/min)	LENGTH (in)	PROGRAM NUMBER
STATUS <div style="border: 1px solid black; padding: 2px; text-align: center;">-12.34</div>	STATUS <div style="border: 1px solid black; padding: 2px; text-align: center;">-12.34</div>	STATUS <div style="border: 1px solid black; padding: 2px; text-align: center;">12</div>
SET POINT <div style="border: 1px solid black; padding: 2px; text-align: center;">-12.34</div>	SET POINT <div style="border: 1px solid black; padding: 2px; text-align: center;">-12.34</div>	SET POINT <div style="border: 1px solid black; padding: 2px; text-align: center;">12</div>

LONG AXIS  
NOT SELECTED

SHORT AXIS  
NOT SELECTED

>

CYCLE (F4) >  
STOP

NEXT (F8) >

FIG. 17E

**SURFACE KEYING SETUP/OPERATION SCREEN**

< (F9) AUTO/  
DRY RUN

**MACHINE STATUS**

1.0 IDLE

ENABLE SERVO'S

**SURFACE KEYING STATUS**

5.0 KEYING SEQUENCE IDLE

PRESS CYCLE START TO BEGIN

CYCLE (F4) >  
STOP

**SYSTEM STATUS**

MAINTENANCE  
MODE

SHORT AXIS  
POSITION

-12.34 (in)

LONG AXIS  
POSITION

-12.34 (in)

< (F11) CYCLE  
START

**SURFACE KEYING PARAMETERS**

LBU

PROGRAM NUMBER

STATUS 12

SET POINT 12

SHORT AXIS  
LENGTH (in)

STATUS -12.34

SET POINT -12.34

LONG AXIS  
LENGTH (in)

STATUS -12.34

SET POINT -12.34

SPEED (in/min)

STATUS -12.34

SET POINT -12.34

OFFSET (in)

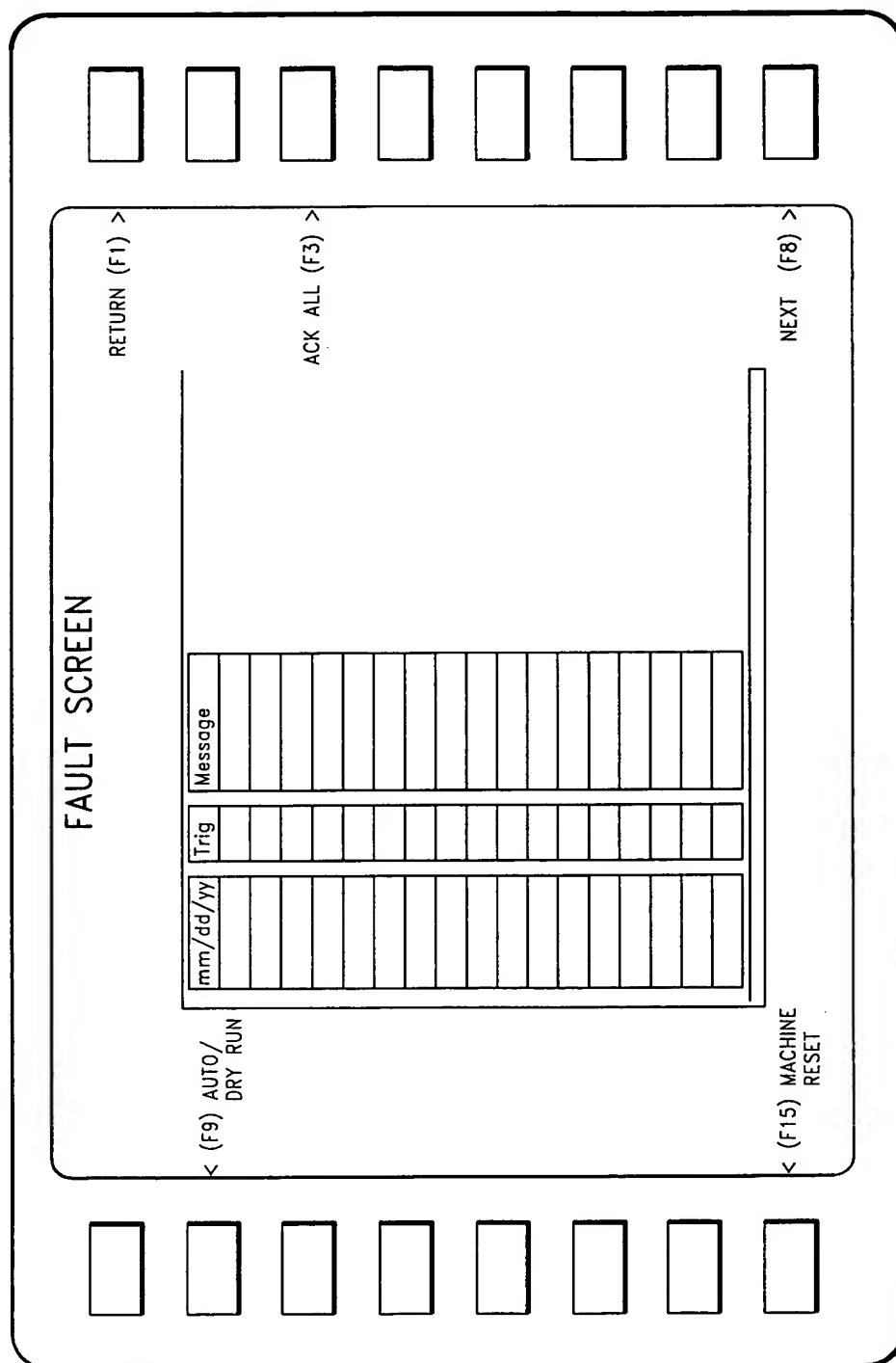
STATUS -12.34

SET POINT -12.34

NEXT (F8) >

< (F15) MACHINE  
RESET

FIG. 17F



*FIG. 17G*

**MAINTENANCE SCREEN**

WARNING:  
OPERATION FROM THIS SCREEN  
BYPASSES SYSTEM INTERLOCKS

SYSTEM STATUS

MAINTENANCE  
MODE

VACUUM  
CUP 1 ON

VACUUM  
CUP 2 ON

VACUUM  
PRESSURE 1

VACUUM  
PRESSURE 2

LONG AXIS  
DRIVE DISABLED

SHORT AXIS  
DRIVE DISABLED

LASER AIR  
SOLENOID OFF

LASER AIR  
PRESSURE

LONG AXIS  
NOT HOMED

SHORT AXIS  
NOT HOMED

LASER  
FAULT

JOG SPEED  
(in/min)

STATUS -12.34

SET POINT -12.34

< (F9) AUTO/  
DRY RUN

< (F10) DRIVE  
ENABLE

< (F11) VACUUM  
CUPS ON

LONG AXIS

< (F12) HOME

< (F13) FORWARD  
(in) -12.34

< (F14) REVERSE

< (F15) MACHINE  
RESET

ALARMS (F1) >

LASER AIR (F2) >  
ON/OFF

DRIVE (F3) >  
DISABLE

VACUUM (F4) >  
CUPS OFF

SHORT AXIS

HOME (F5) >

FORWARD (F6) >  
(in) -12.34

REVERSE (F7) >

NEXT (F8) >

FIG. 17H

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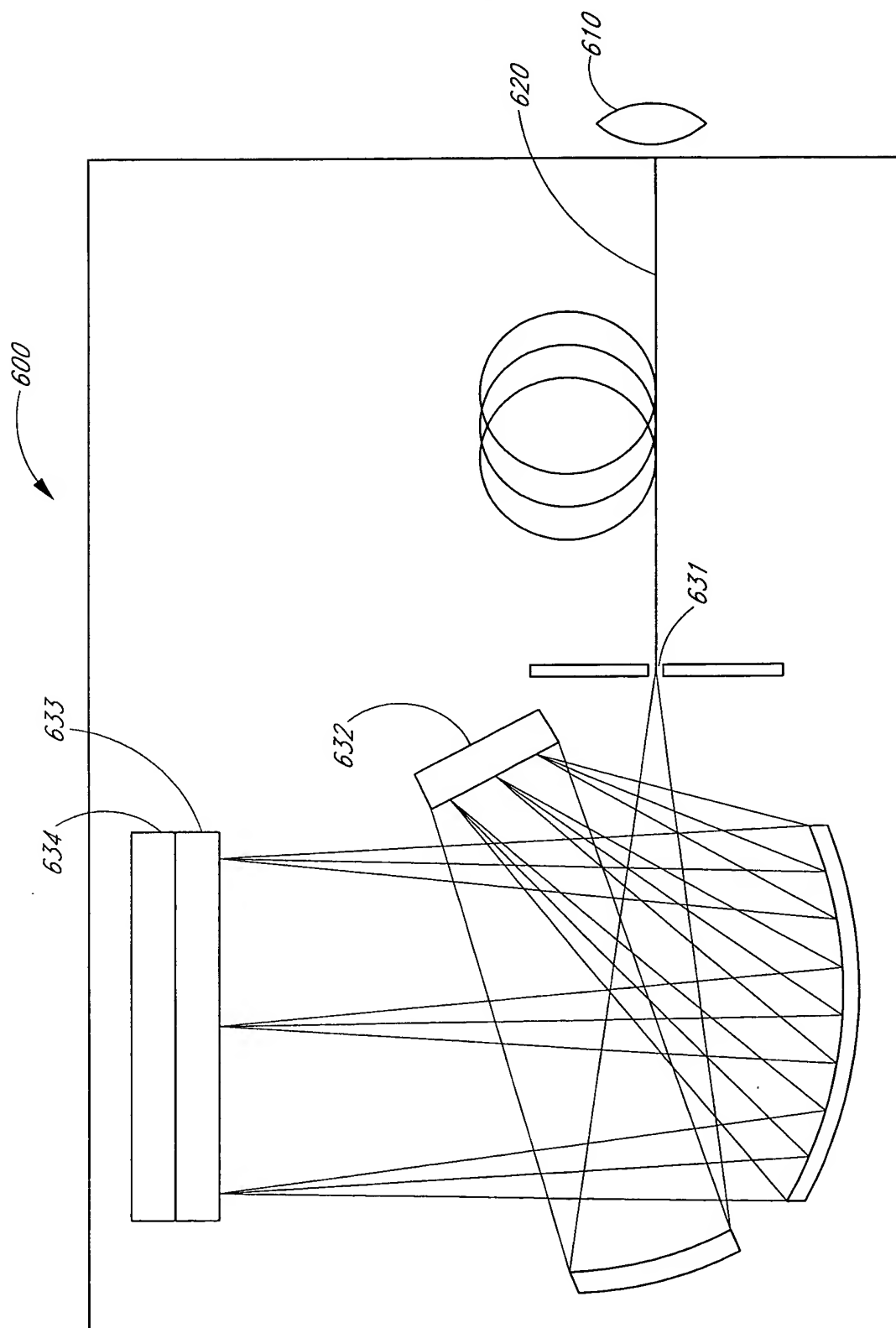


FIG. 18A

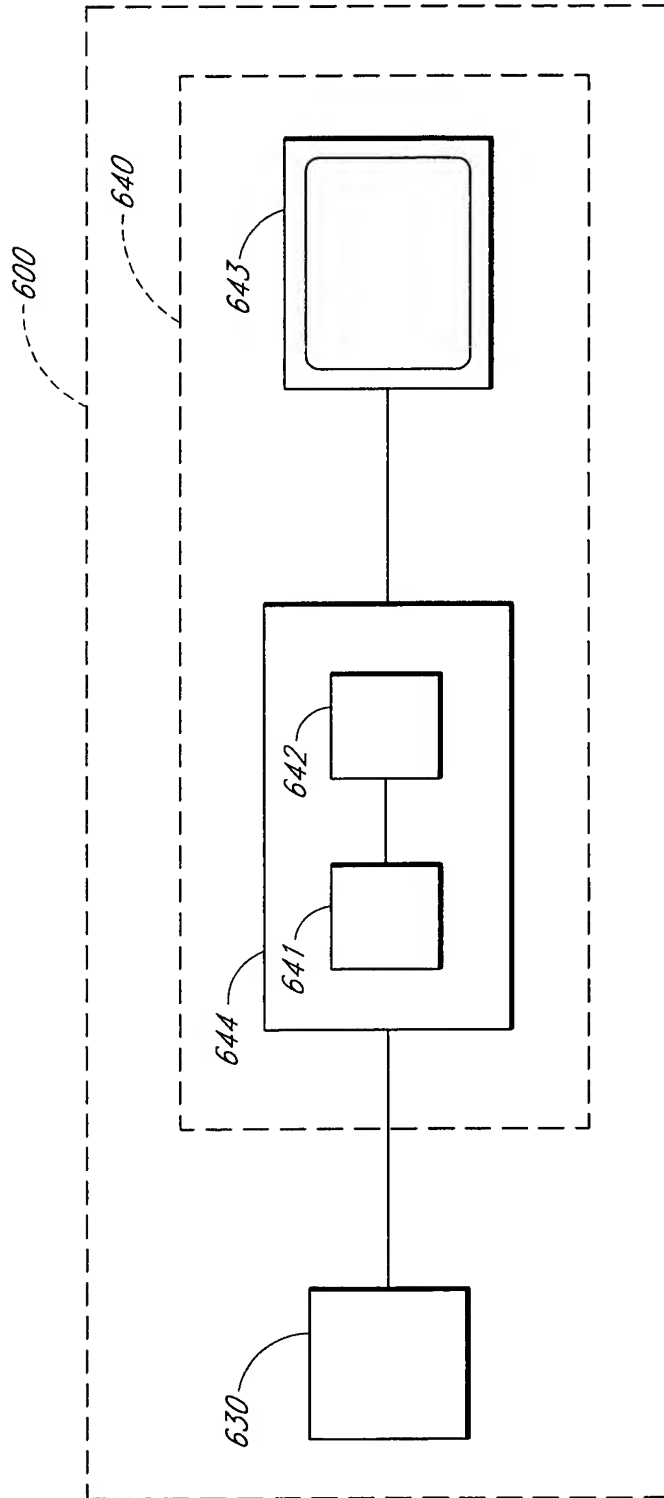


FIG. 18B

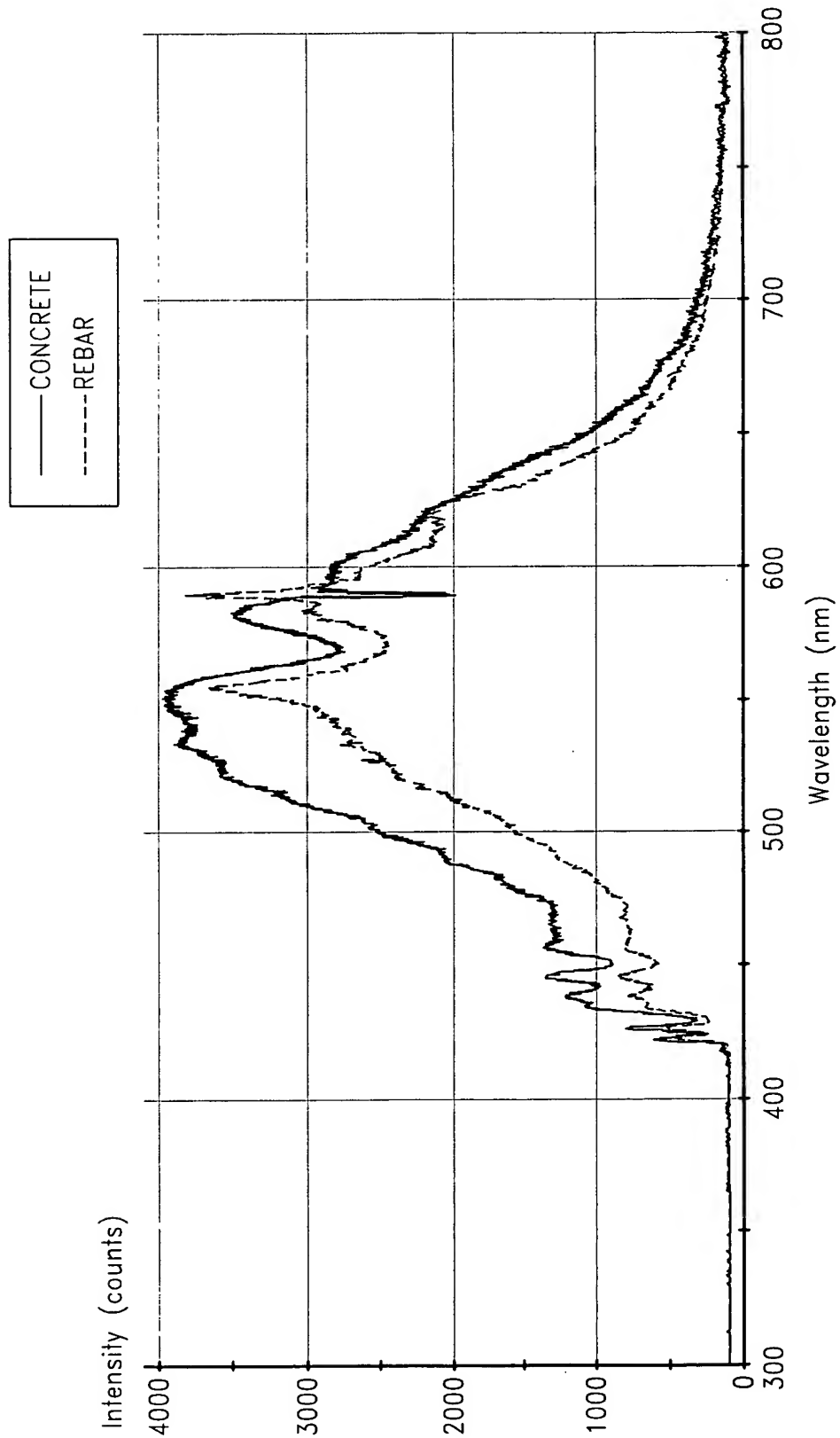


FIG. 19



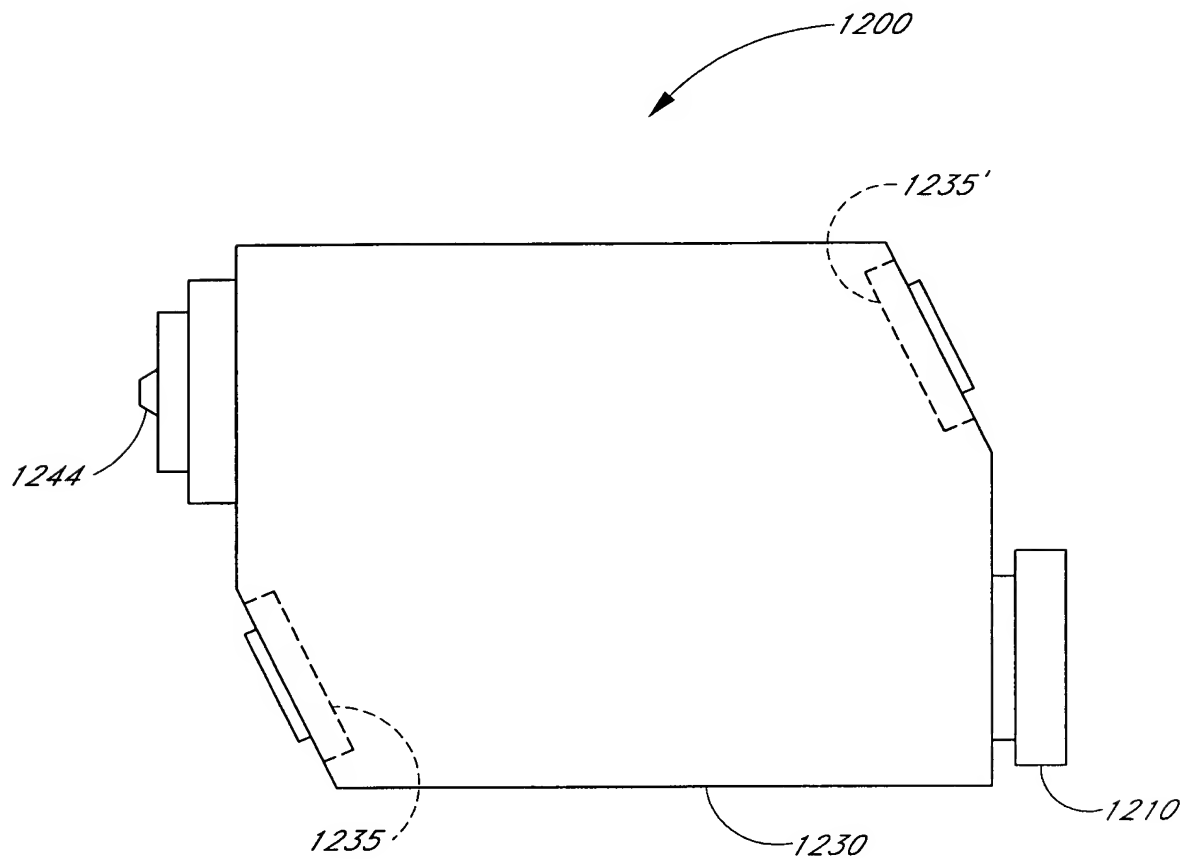


FIG. 20

FIG. 21A

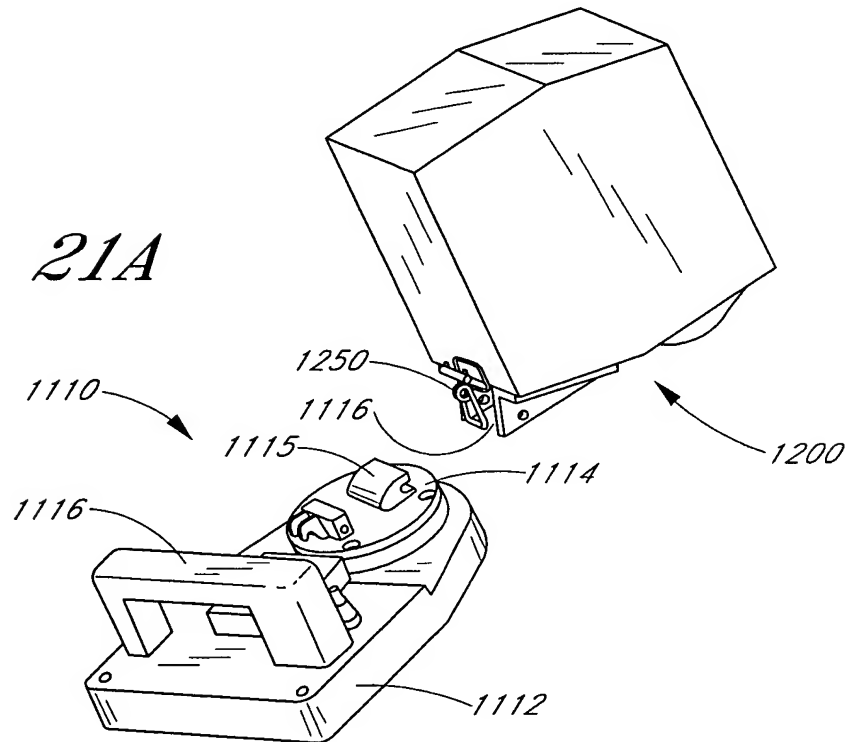
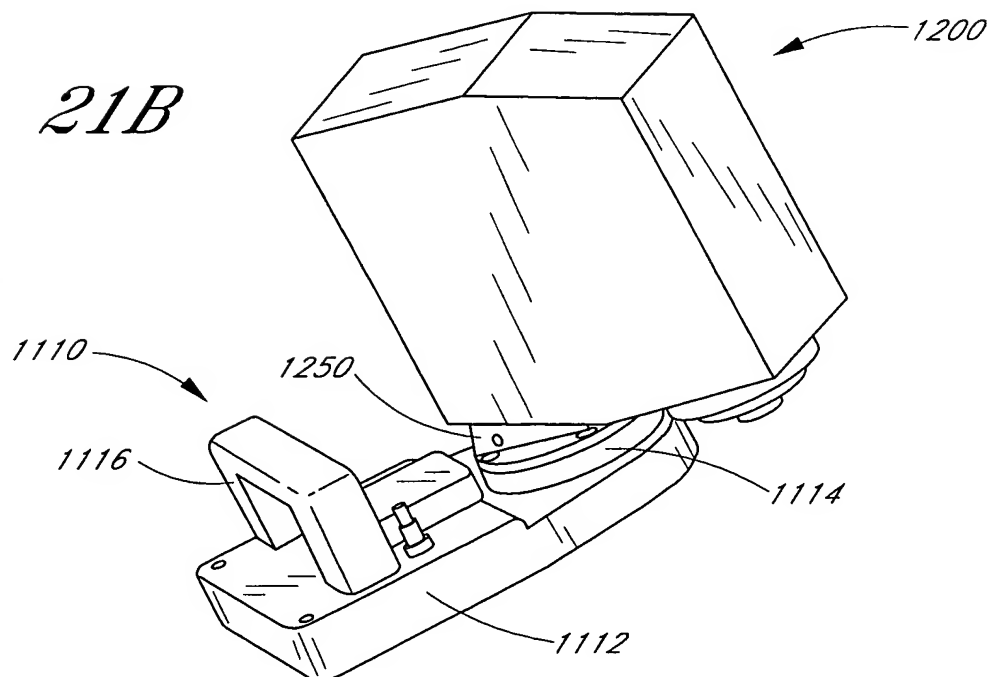


FIG. 21B



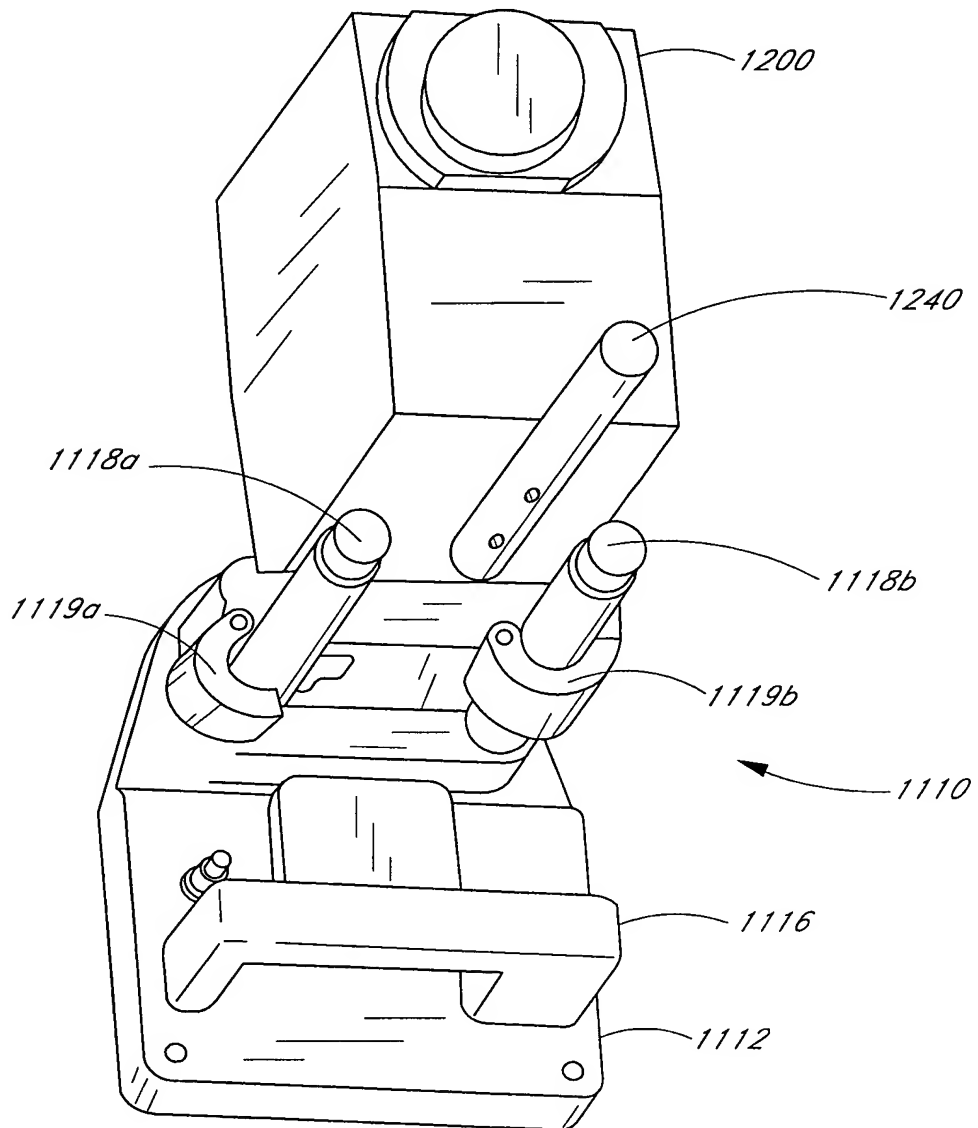


FIG. 21C

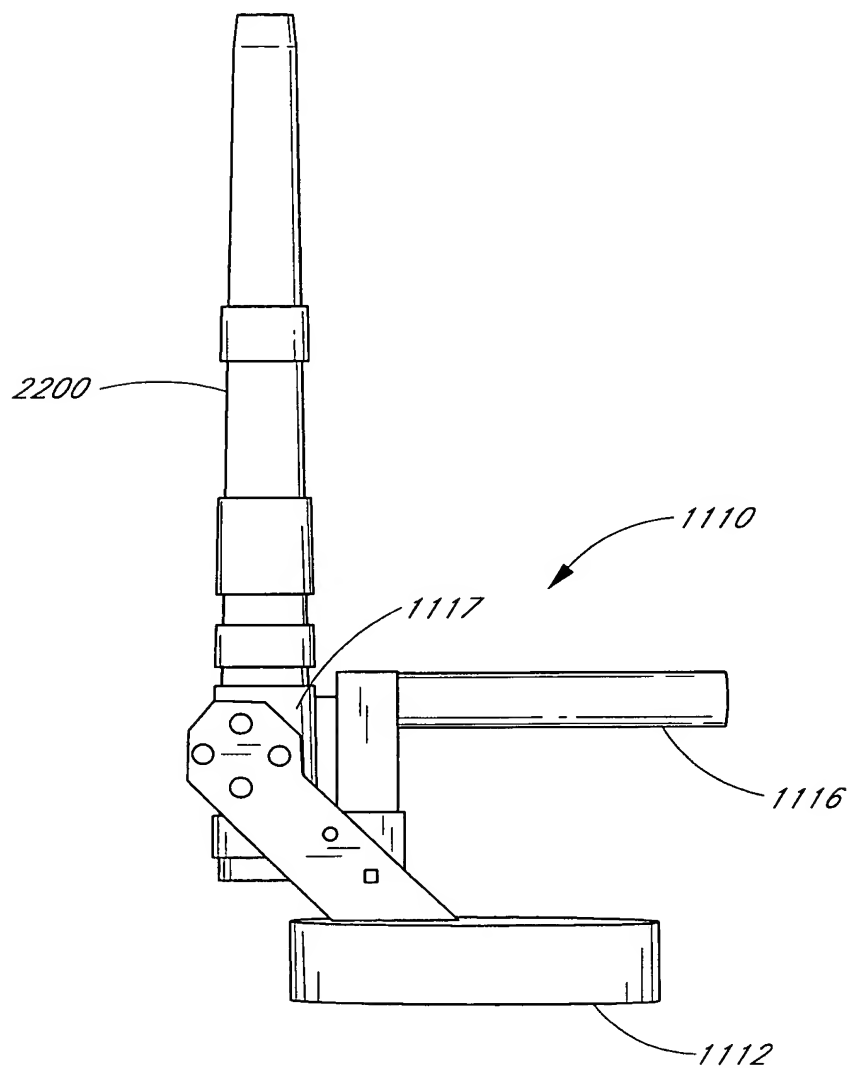


FIG. 21D

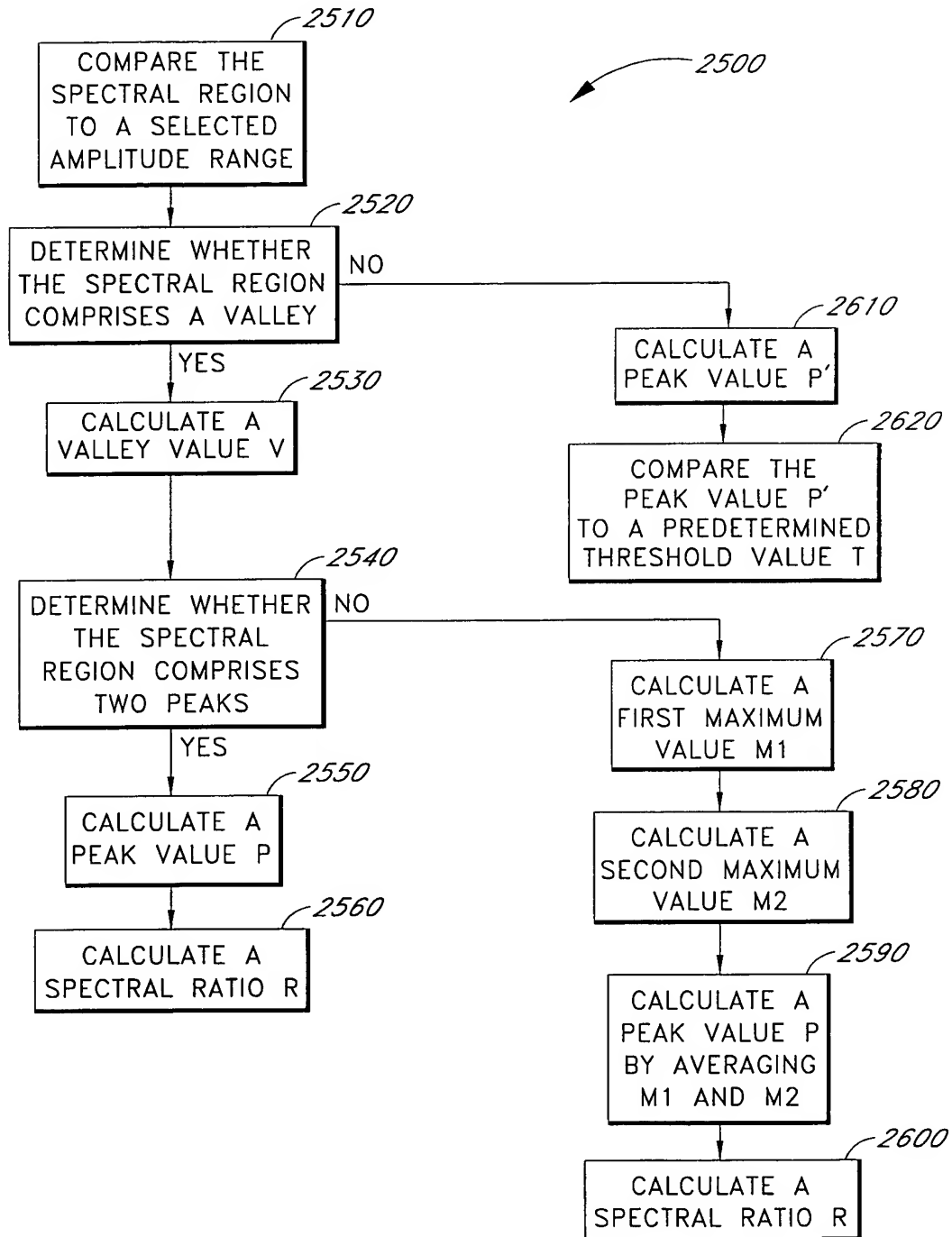


FIG. 22